Description

A method, process and computer program to automatically create a customized three-dimensional nail object

Cross Reference to Related Applications

[0001] This application references U.S. patent application Serial No. 10/708,065, filed Feb. 6, 2004.

Background of Invention

[0002] While working with fingernails and fingernail objects for several years, there was no easy way to automatically create a three-dimensional model of an artificial fingernail object. In fact, most software in the market allows a user to manually manipulate and create just about any three-dimensional object conceivable, but the process of doing this manually is very time consuming and allows for too much human error when creating artificial fingernails with a consistent and reliable appearance. Because of this the

inventors set out to find a method to create artificial fingernail objects automatically and this invention was the result. Through careful analysis and study, the key reference points outlined in the Claims section show how to focus a computer software modeling program on a few critical points and then with the help of some supplied parameters relating to expected lengths, widths, heights and curves a desired artificial fingernail object will be automatically created. This new desired three-dimensional object has many applications, not the least of which is the ability to physically create the nail object for the individual and supply them with an artificial nail for use as a cosmetic or even prosthesis. The invention can now save time and virtually guarantee consistent looking fingernail objects, all accomplished with relative ease.

SUMMARY OF INVENTION

[0003] The invention is a method, process and computer program to automatically create a customized three-dimensional artificial nail object based upon an actual/existing digitized nail surface. This particular invention generates the overall desired three-dimensional nail surface by using key reference points contained in the digitized nail surface to automatically create new three-

dimensional data along supplied parameters. The application of the invention results in a wide scope of possible implementations including a use for creating artificial fingernails and artificial toenails.

BRIEF DESCRIPTION OF DRAWINGS

[0004] Fig. 1 is a diagram demonstrating the Axis and digitizing of the nail surface object.

[0005] Fig. 2 is a diagram of the step to determine the Y-Center line as ½of the X-Axis.

[0006] Fig. 3 is a diagram of the X-Line as 2/3rds of the Y-Axis from measuring from the cuticle.

[0007] Fig. 4 is a diagram of the periphery points.

[0008] Fig. 5 is a diagram showing the digitized surface used to generate the Top Surface and the combination of the two surfaces to form the desired artificial nail object.

[0009] Fig. 6 is a diagram showing the new customized nail object fitting over the digitized surface.

DETAILED DESCRIPTION

[0010] By starting with an existing digitized three-dimensional surface point array of an actual fingernail or toenail, the invention permits the automatic creation of a new customized three-dimensional object that will fit over the ac-

tual fingernail or toenail. This is accomplished by evaluating key points of data contained in the digitized array and by correctly interpreting the reference points and combining with the supplied parameters a new three-dimensional object can be generated, which when combined with the existing digitized three-dimensional object, will create a desired artificial nail object.

[0011] The key reference points may include all of the points of data contained in the digitized three-dimensional surface array. However, it is more likely that the following key reference points are used to create the top surface: periphery points, the points along the Y-Axis in the middle of the X-Axis, the points located along the X-axis measured at approximately 2/3rds the distance along the Y-axis from the cuticle end of the nail surface. These reference points are then combined with supplied parameters which may be either constants or changed at the time the desired nail object is generated. The supplied parameters include curves, length, widths and heights. The supplied parameters work with the key reference points to create an expected and desired new three-dimensional object that will fit over the actual fingernail or toenail.

[0012] In Fig. 1 the first step of the process is demonstrated,

where a *digitized nail surface* 100 is shown and the orientation of the X, Y and Z Axis is established. Here the *X-axis* 110 is found along the width of the *digitized nail surface* 100; the *Y-axis* 120 is the length of the *digitized nail surface* 100 and can be determined initially by measuring from the cuticle to the tip of the *digitized nail surface* 100; and the *Z-axis* 130 represents the height or depth of the *digitized nail surface* 100. Orienting the three-dimensional data is necessary in order to measure the *digitized nail surface* 100 and determine the key reference points which are used in conjunction with the supplied parameters to create new three-dimensional data representing the top surface of the final three-dimensional nail object.

[0013] Measuring the digitized surface area includes creating a relationship of the *X-axis* 110, *Y-axis* 120 and *Z-axis* 130 to millimeters or inches, further arcs and curves of the *digitized nail surface* 100 are determined by measuring and creating relationships between the three-dimensional points of data along the *X-axis* 110, *Y-axis* 120 and *Z-axis* 130. These curves and arcs are utilized and manipulated in creating the top surface and eventual desired three-dimensional artificial nail object.

[0014] Fig. 2 demonstrates the determination of the points along

the *Y-Center line* 200 by taking the sum of points along the greatest *X-axis* 110 and dividing that by 2 to end up with a midpoint within the *X-axis* 110. This centerline reference is then utilized to find the center of the *digitized nail surface* 100 and all of the points along that axis in the Y plane are then utilized to help determine the arc, curve and position of the *Generated Nail Surface* 500.

[0015] Fig. 3 shows another key reference point being determined by taking 2/3rds of the distance of the greatest *Y-axis* 120 from tip to cuticle. Once that reference point is determined then all of the *X-axis* 110 points are utilized to help determine arc, curve and position of the *Generated Nail Surface* 500. The intersection in this case between the *X-axis* 110 and *Y-axis* 120 represents the highest point of the *Generated Nail Surface* 500, which will be no greater than 25 millimeters from the *Digitized nail surface* 100.

[0016] Once the reference points creating heights, lengths and arcs are determined, then Fig. 3 shows the determination of the *periphery points* 400. This step is vital to insure that the new *Generated Nail Surface* 500 will fit over the *Digitized nail surface* 100. The *periphery points* 400 are combined with the supplied parameters to determine the top surface of the *Generated Nail Object* 600.

[0017] With all the key reference points in mind, Fig. 5 shows the actual new *Generated Nail Surface* 500 which is a three-dimensional array of data created by the reference points in relationship and combination with supplied parameters indicating the overall desired nail object. The supplied parameters include the desired length, height and width preferences for the desired nail object. The *Generated Nail Object* 600 combines the top surface calculations with the *digitized nail surface* 100 to create one consistent and expected artificial nail object. The new nail object will be customized to each particular *digitized nail surface* 100 and will fit on top of the *digitized nail surface* 100.

[0018] Fig. 6 shows the *Generated Nail Surface* 500 combined with the *Digitized Nail Surface* 100 as one *Generate Nail Object* 600, fitting over the top of the original *Digitized Nail Surface* 100.

[0019] By completing the steps above, virtually any software program or user would be capable of generating a desired and customized three-dimensional artificial nail object. The entire objective of the preferred embodiments of the invention has been to create a simplified method, process and computer program to automatically create a customized three-dimensional nail object. The application of this invention is extensive and plentiful, as with this in-

vention it will become trivial to generate desired three-dimensional artificial nail objects by automation quickly and easily. Because of the advantages inherent in this invention it is anticipated that many variants of this invention are possible, which should be included within the preferred embodiments and descriptions of this invention.